

2010 Illinois Sustainable School Symposium



Adlai E. Stevenson High School

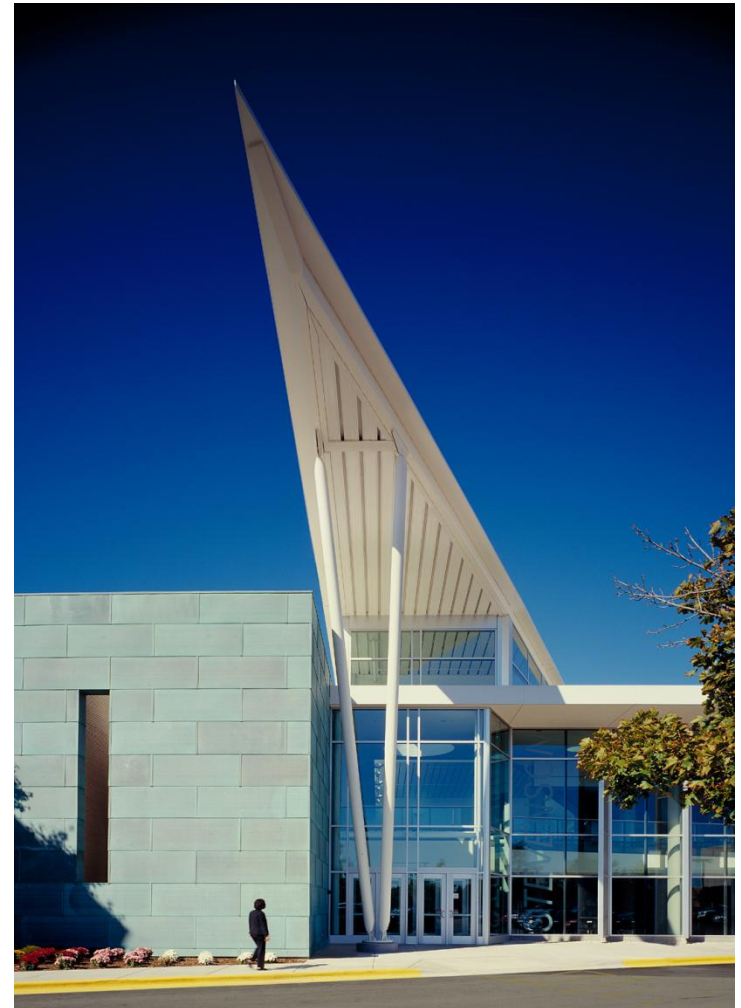
April 9, 2010

Adlai E. Stevenson High School

Merv Roberts, Board of
Education – Introduction

Jason Carlson, Environmental
Science Teacher – Curriculum &
Learning

Stuart Brodsky, OWP/P-Cannon
Design – LEED AP



Adlai E. Stevenson High School



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ADLAI E. STEVENSON HIGH SCHOOL
STEVENSON
DISTRICT 125 LINCOLNSHIRE, ILLINOIS

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About Stevenson High School

Since opening in 1965, Adlai E. Stevenson High School has become one of the leading high schools in America. Stevenson is the only public high school in Illinois to receive four Blue Ribbon Awards for Excellence in Education from the U.S. Department of Education. SHS won the award in 1987, 1991, 1998 and 2002. Stevenson also received the U.S. Department of Education's New American High Schools Award in 1998. *Newsweek* and *U.S. News and World Report* have ranked Stevenson among the top high schools in the country. Stevenson also is included annually in the School Watch and School Match listings of schools that offer features most sought by parents.

Stevenson offers more than 200 courses in communication arts, mathematics, science, social science, foreign languages, fine arts, applied arts and physical welfare. Classes are taught by a talented and experienced corps of teachers, three-fourths of them with a master's degree or more. Several teachers at SHS are considered by their peers to be among the country's foremost authorities in their fields. Some of the textbooks and teaching practices used around the United States can trace their roots to Stevenson High School.

Stevenson's Advanced Placement program is among the nation's best. More than 20 AP classes are available and SHS regularly leads the Midwest region in AP participation and has ranked in the top five worldwide.

Approximately 98 percent of SHS graduates attend college. Of that group, 8 in 10 will attend four-year colleges and universities while the remainder enroll at two-year schools. About 7 in 10 SHS graduates enroll at public colleges and universities.

Stevenson has nearly 100 co-curricular clubs and activities open to students.



Stevenson at a Glance

- Enrollment: 4,345
- Average Class Size: 22
- Students Bound for College: 98%
- Attendance Rate: 95.8%
- Graduation Rate: 96.3%
- Expenditure Per Student: \$13,706
- Average ACT Score: 25.7
 - No. of Seniors Taking Exam: 1,114
 - Mathematics: 26.6
 - English: 26.1
 - Reading: 25.2
 - Science: 24.5
- SAT Scores:
 - No. of Seniors Taking Exam: 201

Done  Internet

History of Green Initiatives

- Energy Star Award
 - 2001 rating of 79 for 1993 instruction of 300,000 ft.²
 - 2010 rating of 79 for the entire facility of 833,000 ft.²





Stevenson High School Green Committee

- Creation of Green Committee
 - Developed Mission, Vision & Values
 - Considered LEED vs Carbon Management
 - The decision was made to compute a carbon footprint to establish a baseline for future years.
 - The following year the district established a Carbon Management Plan.
 - Developed Green Goals





Stevenson High School Green Mission Statement

- Promote life-long learning for students, staff and community members to enable effective decision-making in the use and preservation of natural resources.

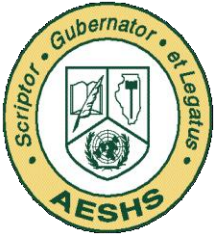


Stevenson High School

2007-08 Carbon Footprint



- Total Carbon - 15,289 CDE's
CDE's = Carbon Dioxide Equivalents
"Green House Gases"
- Breakdown:
 - Purchased Electricity 5,925 tons 38.7%
 - Transportation 4,217 tons 27.5%
 - Solid Waste Management 2,687 tons 17.5%
 - Purchased Natural Gas 2,393 tons 15.6%
 - Miscellaneous 74 tons .5%



Stevenson High School Green Goals

- 1) Increase awareness and participation in **Green Initiatives**
- 2) Reduce **Kilowatts** by 5% per year
- 3) Increase **recycled waste** content by 50% in the next year
- 4) Reduce **paper usage and the copies** made by 10% next year
- 5) Reduce **natural gas** usage by 5% next year
- 6) Reduce **fossil fuel vehicles** on campus by 10% next year

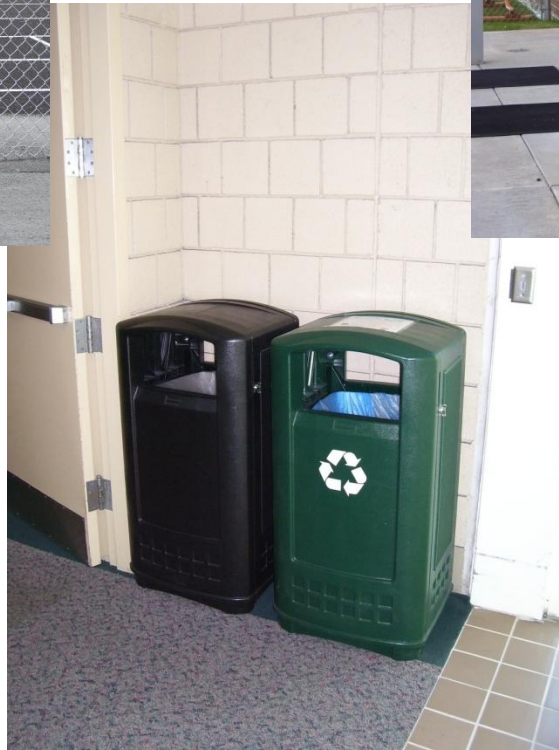
Stevenson High School

Some Early Successes

New Recycling System



New in 2008-09



New in 2008-09

Stevenson High School

Some Early Successes



Composting of Yard
Waste – 365 days a
year process.



It is estimated that 27 yards of organic
material was composted by the
Grounds Crew during 2009.



Stevenson High School

Some Early Successes



Reclamation of Rainwater

During the summer of 2009, it is estimated that the District collected over 6,000 gallons of rain water.



Stevenson High School

Some Early Successes

Reduced salt used on
sidewalks / stairs by 47%
by using beet juice.

Retrofit of a 15-year-old
sprayer.



Stevenson High School

- Sustainability
—Responsibility



- Accountability
- You cannot manage until you can measure

But it's really about accountability



- **What can we do to reduce, recycle reuse?**
 - **Electric?**
 - **Transportation?**
 - **Waste Stream?**
 - **Natural Gas?**

Stevenson's Electric Usage

- Stevenson uses **10,000,000** kilowatt-hours per year
 - Equivalent to 695 homes using 1,200kwhr/month
 - Equivalent to a community of 2,800 people





Stevenson's Electric Usage

- Efforts to reduce Stevenson's Electric Usage
 - 1995 Smart Building Technologies
 - 1997 Co-Generation Plant / Peaker Plant
 - 1999 Variable Frequency Drive upgrades
 - 2000 AHU / RTU Replacements
 - 2002 West Building Lighting Upgrades
 - T12's to T8's
 - SportCenter – 1,000 watt to 400 watt
 - Fieldhouse 1,000 watt to 400 watt
 - 2004 Boiler Replacement
 - 2008 Lighting Upgrades
 - 2009 Sub-metering of Electrical system.



Stevenson's Transportation



- Stevenson is an organization of **5,000** people – 4,400 students and 600 adults
 - 3,300 ride the bus (55 buses at 60 kids)
 - 600 adults come onto campus daily
 - 1,100 students drive or get rides
- Actual vehicle count: 4,971 cars per day!
- Opportunitites!

Stevenson's Transportation

- Encourage alternative forms of transportation
 - Take the bus – parking permits
 - Shuttle to and from train station
 - Bike to school week – incentives
- Preferred Parking for car pools



Stevenson's Waste Stream

- 320 of Solid Waste per year
- Recycling:
 - 100 tons in 2008-09 - 32%
 - 2009-2010 Goal = 150 tons



Stevenson's Waste Stream

- Estimated 43 tons of Kitchen waste that could be composted.
- Yard Waste 27 cubic yards are composted.
- Vermi Composting - Foods Lab is using vermi composting to grow vegetables.



Stevenson's Waste Stream

- Reduce paper use by 10%:
 - **25,000,000** copies per year
 - **5,000** boxes of paper
 - **5,000** sheets of paper per person
 - **125 tons** of paper per year
 - It takes **17 trees** to make a ton of paper.
 - Stevenson uses **2,125 trees** every year.



Stevenson's Waste Stream

- Waste Stream Audit
 - 60 – 70 % Recyclables
 - Dual Stream Recycling
 - Cardboard Baler – 2010 DECO Application
 - Partnering with Feeder Districts
 - Compostable Serving Ware
- Paper Reduction
 - Board Doc's
 - Minuteman Magazine
 - On-line Registration
 - On-line grading
 - Scanning, Scan to e-mail
 - Multifunction Devices – Duplex default



Stevenson's Natural Gas Usage

- Stevenson burns about **332,000** natural gas therms per year.
 - Equivalent to 217 homes using 127.50 therms/month
 - Equivalent to a community of 868 people



Stevenson's Natural Gas

- We're working with our HVAC provider to drill down our Natural Gas usage.
 - Smart Building Technologies – Metasys
 - Developing and monitoring comfort set points
 - Continuous Commissioning through Facility Performance Indexing.

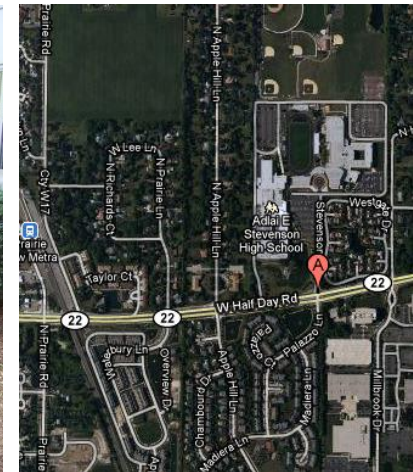
Stevenson High School

- Jason Carlson, Environmental Science Teacher



Stevenson High School Co-Curricular Opportunities

- A History of Green
 - SAVE
 - Club Dirt
 - Green Team
 - Recycle Week
 - Earth Week
 - Youth & Government





Stevenson High School Academic Opportunities

- Going Green has provided many new and exciting learning opportunities
 - Green Roof Installation
 - Installation of Photovoltaic Panels
 - Purchase of Prius for Drivers Education
 - Participation in LEED Certification
 - Creation of Net Zero Classroom

Stevenson High School 2007-08 Green Roof



Stevenson High School 2008-09 Photovoltaic System



Stevenson High School

2009-10 Purchase of Prius

- Greening of All Departments
 - Drivers Education
 - Learning about alternatives to fossil fuel vehicles
 - Opportunity to discuss types of hybrid vehicles
 - Opportunity to learn about miles per gallon comparisons



Stevenson High School

2009-10 LEED Certification

- Curriculum and Education Goals

1. Participation on all LEED Committees
 1. Site Management
 2. Purchasing & Procurement
 3. Mechanical Systems
 4. Green Cleaning
2. Water Flow Study
3. Light Meter Readings
4. Comfort Survey
5. Transportation Survey

- Key to whole process is to provide learning opportunities.

Requirements

Demonstrate that at least 15% of the precipitation which falls on the site for the 2-year, 24-hour storm event is infiltrated and/or collected for reuse.

The easiest way to document compliance is by providing a stormwater assessment report. If this is not available, then stormwater calculations must be provided as follows:

First, determine the volume of runoff from the site:

Determine the 2-year, 24-hour storm rainfall intensity (inches per hour), and the areas and surface types of each unique surface covering the site (excluding surface water). The provided spreadsheet calculator may be used.

$$Q = CiA$$

Where Q = peak runoff rate (cubic feet per second)

C = runoff coefficient

i = rainfall intensity (inches per hour)

Second, determine the amount of runoff mitigated by storage in retention facilities. The amount of runoff reduced by a retention facility is based on its storage volume, the rate at which it is emptied, and the interval between storm events.

1. Determine the amount of captured runoff

$$V_r \text{ (cubic feet)} = (P)(R_v)(A)/12$$

Where V_r = volume of captured runoff

P = average rainfall event (inches)

$R_v = 0.05 + (0.009)(I)$ where I = percentage impervious of collection surface

A = area of collection surface (square feet)

2. Assess the minimum drawdown rate necessary to empty the pond before the next rainfall:

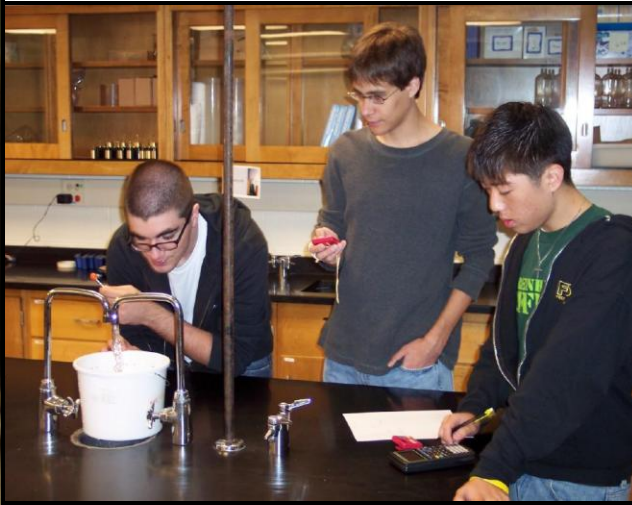
$$Q_r \text{ (cubic feet per second)} =$$

$$\text{Retention Capacity (cubic feet)} / \text{Rainfall Event Interval (seconds)}$$

Where Q_r = minimum drawdown rate to empty before next storm event

If actual drawdown rate is less than the minimum (in other words, if the retention facility is not typically emptied between storm events) the volume of runoff presumed to be mitigated by collection in retention facility must be reduced, accordingly.

After all, isn't it about the students?



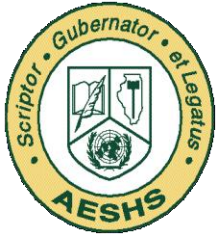
Increasing awareness and participation starts with curriculum

Stevenson High School

2009-2010 FMP Pilot Program



- Incorporate Green Initiatives into FMP Program
 1. **Light Bulbs**
 2. **Cars**
 3. **Recycling**
 4. **Water Bottles**
 5. **Landscaping**
 6. **Biodiversity**
 7. **Energy**



Content Area Curriculum

Home energy project

Initiatives require directors to document how the mission is being met within each division.

APES Home Energy Project

We have been discussing electricity generation and the benefits of increasing the efficiency with which we use energy. While learning about all this in class is great, it really doesn't mean anything unless you apply these lessons in your life outside of class.

With that in mind, I have a job for you. I would like you to improve the energy efficiency of your home. You may do this in one of several ways. You may choose from one of the following projects (or another that you think of and clear with me). For ideas go to EnergyStar at:

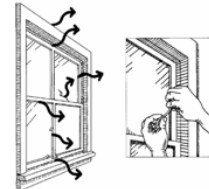
http://www.energystar.gov/index.cfm?c=home_improvement.hm_improvement_index

1. Purchase and install at least 5 energy efficient light bulbs (fluorescent or LED).
2. Purchase and install a water heater blanket.
3. Improve the efficiency of your doors and/or windows by purchasing and installing weather-stripping, window insulation, and/or caulk.
4. Improve the efficiency of your heating system by duct-taping/caulking leaks in the ductwork or insulating the ductwork.
5. Reduce your energy demand by installing a programmable thermostat.
6. Install insulated switch plates for electric sockets or light switches on all external wall outlets.



For whichever project you choose you must complete the following tasks:

1. Take pictures of the installation
2. Write a narrative describing the process of purchasing and installing the equipment.
3. Provide calculations (get electricity/gas prices from recent bill) along with a description of the assumptions you made. Many numbers require some guessing. Make educated guesses and explain.
 - a. Energy & monetary cost of current system per year.
 - b. Energy & monetary cost of new, more efficient system per year (excluding purchase and installation costs).
 - c. Annual energy and money savings with new system
 - d. With purchase and installation costs of new system included, how long will it take to recoup the costs of the new system?
4. Provide a copy of the receipt from the purchase of the materials.



This entire project will be due Tuesday, March 2nd. It is worth 30 points.

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